



DOCKET NO.: ISIS-5243

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Vasulinga T. Ravikumar, et al.

Application No.: 10/665,822

Filing Date: September 19, 2003

For: SYNTHESIS OF OLIGONUCLEOTIDES

Confirmation No.: Not Yet Assigned

Group Art Unit: Not Yet Assigned

Examiner: Not Yet Assigned

DATE OF DEPOSIT: *October 13, 2003*

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Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 CFR § 1.56 and in accordance with 37 CFR §§ 1.97-1.98, information relating to the above-identified application is hereby disclosed. Inclusion of information in this statement is not to be construed as an admission that this information is material as that term is defined in 37 CFR § 1.56(b).

In accordance with § 1.97(b), since this Information Disclosure Statement is being filed either within three months of the filing date of the above-identified application, within three months of the date of entry into the national stage of the above identified application as set forth in § 1.491, before the mailing date

of a first Office Action on the merits of the above-identified application, or before the mailing date of a first Office Action after the filing of request for continued examination under § 1.114, no additional fee is required.

- In accordance with § 1.129(a), this Information Disclosure Statement is being filed in connection with  the first or  second After Final Submission, therefore:
  - Certification in Accordance with § 1.97(e) is attached; or
  - The fee of \$180.00 as set forth in § 1.17(p) is attached.
- In accordance with § 1.97(c), this Information Disclosure Statement is being filed after the period set forth in § 1.97(b) above but before the mailing date of either a Final Action under § 1.113 or a Notice of Allowance under § 1.311, or before an action that otherwise closes prosecution in the application, therefore:
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- In accordance with § 1.97(d), this Information Disclosure Statement is being filed after the mailing date of either a Final Action under § 1.113 or a Notice of Allowance under § 1.311 but before, or simultaneously with, the payment of the Issue Fee, therefore included are: Certification in Accordance with § 1.97(e); and the submission fee of \$180.00 as set forth in § 1.17(p).
- Copies of each of the references listed on the attached Form PTO-1449 are enclosed herewith.

- Copies of references listed on the attached Form PTO-1449 are enclosed herewith
- Copies of references listed on the attached Form PTO 1449 are not required to be submitted pursuant to the June 30, 2003 recent revisions to 37 CFR § 1.98(a)(2)(i).

EXCEPT THAT:

- In view of the voluminous nature of references [list as appropriate], and the likelihood that these references are available to the Examiner, copies are not enclosed herewith.
- In accordance with § 1.98(d), copies of the following references listed on the attached Form PTO-1449 are not enclosed herewith because they were previously cited by or submitted to the U.S. Patent and Trademark Office in patent application(s) for which a claim for priority under 35 U.S.C. § 120 have been made in the instant application:
  - Copies of references **1-5, 30-34 and 52-53** listed on the attached Form PTO-1449 were previously cited by or submitted to the Patent and Trademark Office in prior Application No. **08/099,075 now U.S. Patent 5,614,621**, filed **July 29, 1993**;
  - Copies of references **6-23 and 35-41** listed on the attached Form PTO-1449 were previously cited by or submitted to the Patent and Trademark Office in prior Application No. **08/249,442 now U.S. Patent 5,571,902**, filed **May 26, 1994**;
  - Copies of references **24-29, 42-48 and 54-57** listed on the

attached Form PTO-1449 were previously cited by or submitted to the Patent and Trademark Office in prior Application No. 08/692,909 now U.S. Patent 6,001,982, filed July 31, 1996.

Please charge any deficiency or credit any overpayment to Deposit Account No. 23-3050. This form is submitted in duplicate.

- The relevance of those listed references which are not in the English language is as follows:
- There are no listed references which are not in the English language.

Date: October 13, 2003

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<b>Form PTO-1449 Modified</b>		Docket No. ISIS-5243	Application No. 10/665,822
List of Patent and Publications Cited by Applicant (Use several sheets if necessary)		Applicant Vasulinga T. Ravikumar, et al.	
U.S. Department of Commerce Patent and Trademark Office		Filing Date September 19, 2003	Group Not Yet Assigned
		Confirmation No. Not Yet Assigned	
<b>OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)</b>			
	<b>1</b>	Celebuski, et al., "Synthesis and Utility of a DNA Phosphorylating Agent Based on 2-(Triphenylsilyl)ethanol", <i>J. Org. Chem.</i> , 57, (1992), 5535-5538	
	<b>2</b>	Honda, et al., "2-Diphenylmethylsilylethyl Group as a New Protecting Group of Internucleotidic Phosphates in Oligonucleotide Synthesis", <i>Tetrahedron Letters</i> , (1981), 2093-2096	
	<b>3</b>	March, "Advanced Organic Chemistry", John Wiley & Sons, New York, Third Edition, (1985), Chapter 1, pgs. 16-18 and Chapter 9, pgs. 237-239	
	<b>4</b>	Streitwieser and Heathcock, "Introduction to Chemistry", Second Edition, (1981), Chapter 15, 437-440	
	<b>5</b>	Takaku, et al., "Use of 1,1,1,3,3-Hexafluoro-2-Propyl Protecting Group in the Synthesis of DNA Fragments Via Phosphoramidite Intermediates", <i>Tetrahedron Letters</i> , 29, (1988), 81-84	
	<b>6</b>	Beaucage, S. et al., "Advances in the Synthesis of Oligonucleotides by the Phosphoramidite Approach", <i>Tetrahedron</i> 1992, 48(12), 2223-2311.	
	<b>7</b>	Burch, R. et al., "Oligonucleotides Antisense to the Interleukin 1 Receptor mRNA Block the Effects of Interleukin 1 in Cultures Murine and Human Fibroblasts and in Mice", <i>The Journal of Clinical Investigation, Inc.</i> 1991, 88, 1190-1196.	
	<b>8</b>	Higgins, "Medical Sciences", <i>PNAS USA</i> 1993, 90, 9903-9905.	
	<b>9</b>	Iyer, R. et al., "3H-1,2-Benzodithiole-3-one 1,1-Dioxide as an Improved Sulfurizing Reagent in the Solid-Phase Synthesis of Oligodeoxyribonucleoside Phosphorothioates", <i>J. Am. Chem. Soc.</i> 1990, 112, 1253-1254.	
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<b>OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)</b>			
	<b>11</b>	Kamer, P. et al., "An Efficient Approach Toward the Synthesis of Phosphorothioate Diesters via the Schonberg Reaction", <i>Tetrahedron Letters</i> <b>1989</b> , 30(48), 6757-6760.	
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	<b>14</b>	Rao, M.V. et al. "Dibenzoyl Tetrasulphide - A Rapid Sulphur Transfer Agent in the Synthesis of Phosphorothioate Analogues of Oligonucleotides", <i>Tetrahedron Letters</i> <b>1992</b> , 33(33), 4839-4842.	
	<b>15</b>	Simons, M. et al., "Antisense c-myb Oligonucleotides Inhibit Intimal Arterial Smooth Muscle Cell Accumulation <i>in vivo</i> ", <i>Nature</i> <b>1992</b> , 359, 67-70.	
	<b>16</b>	Vu, H. et al., "Internucleotide Phosphite Sulfurization with Tetraethylthiuram Disulfide. Phosphorothioate Oligonucleotide Synthesis via Phosphoramidite Chemistry", <i>Tetrahedron Letters</i> <b>1991</b> , 32(26), 3005-3008.	
	<b>17</b>	Vlassov, V., "Inhibition of Tick-Borne Viral Encephalitis Expression Using Covalently Linked Oligonucleotide Analogs", in "Oligodeoxynucleotides as Antisense Inhibitors of Gene Expression: Therapeutic Implications", June 18-21, 1989, Sheraton Potomac Inn, Rockville, MD.	
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	<b>20</b>	Bannwarth, W., "Synthesis of Oligodeoxynucleotides by the Phosphite-Triester Method Using Dimer Units and Different Phosphorous-Protecting Groups", <i>Helvetica Chimica Acta</i> <b>1985</b> , 68, 1907-1913.	
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<b>OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)</b>			
21	Miura, K. et al., "Blockwise MEchanical Synthesis of Oligonucleotides by the Phosphoramidite Method", <i>Chem. Pharm. Bull.</i> <b>1987</b> , 35(2), 833-836.		
22	Kumar, G. et al., "Improvements in Oligodeoxyribonucleotide Synthesis: Methyl N,N-Dialkylphosphoramidite Dimer Units for Solid Support Phosphite Methodology", <i>J. Org. Chem.</i> <b>1984</b> , 49, 4905-4912.		
23	Wyatt, J. et al, "Combinatorially Selected Guanosine-Quartet Structure is a Potent Inhibitor of Human Immunodeficiency Virus Envelope-Mediated Cell Fusion", <i>PNAS USA</i> <b>1994</b> , 91, 1356-1360.		
24	Ravikumar, V.T., et al., "Use of 2-diphenylmethylsilyethyl group (DPSE) protecting group in oligonucleotide synthesis via phosphoramidite approach," <i>Bioorg. Med. Chem. Lett.</i> , <b>1993</b> , 3, 2637-2640		
25	Ravikumar, V.T., et al., "Synthesis of oligonucleotides via phosphoramidite approach utilizing 2-diphenylmethylsilylethyl (DPSE) as a phosphorus protecting group," <i>Tetrahedron</i> , <b>1994</b> , 50(3), 9255-9266		
26	Koster, H., "Polymer support oligodeoxynucleotide synthesis XX," <i>Nucleosides, Nucleotides</i> , <b>1986</b> , 5, 65-77		
27	Seliger, "2.4. large-scale preparations combined with blockwise phosphotriester synthesis," <i>Methods in Molecular Biology: Protocols for Oligonucleotides and Analogs</i> , Agrawal (Ed.), <b>1993</b> , 20, 396-399		
28	Ecker, D.J., et al., "Rational screening of oligonucleotides combinatorial libraries for drug discovery," <i>Nucleic Acids Res.</i> , <b>1993</b> , 21, 1853-1856		
29	Tanaka, T., et al., "Synthesis of oligoribonucleotides via the phosphate-triester approach on a polymer support," <i>Chem. Pharm. Bull.</i> , <b>1986</b> , 34, 4126-4132		
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**U. S. PATENT DOCUMENTS**

Examiner Initial	Document No.	Date	Name	Class	Subclass
30	4,458,066	7/3/84	Caruthers, et al.	536	27
31	4,490,300	03/1990	Urdea, et al.	536	28.5
32	4,725,677	2/16/88	Koster, et al.	536	27
33	4,845,205	7/4/89	Huynh Dinh, et	536	28
34	5,113,005	5/12/92	Celebuski	556	449
35	3,687,808	08/29/72	Merigan Jr. et al	195	28N
36	4,806,463	02/21/89	Goodchild et al.	435	5
37	5,113,005	05/12/92	Celebuski	556	449
38	5,159,095	10/27/92	Celebuski	556	436
39	4,458,066	07/03/84	Caruthers et al.	536	27
40	5,264,423	11/23/93	Cohen et al.	514	44
41	5,276,019	01/04/94	Cohen et al.	514	44
42	4,786,724	11/1998	Letsinger	536	27
43	5,510,240	04/1996	Lam, et al.	514	44
44	5,571,902	11/1996	Ravikumar, et al.		
45	5,608,046	03/1997	Cook, et al.	536	25.3
46	5,610,289	03/1997	Cook, et al.	536	25.34
47	5,614,621	03/1997	Ravikumar, et al.	536	25.34
<b>EXAMINER</b>			<b>DATE CONSIDERED</b>		



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<b>U. S. PATENT DOCUMENTS</b>						
Examiner Initial		Document No.	Date	Name	Class	Subclass
	<b>48</b>	6,001,982	12/14/99	Ravikumar, et al.	536	22.1
	<b>49</b>	5,847,106	12/1998	Ravikumar, et al.	536	25.34
	<b>50</b>	6,211,350	04/2001	Ravikumar, et al.	536	23.1
	<b>51</b>	6,486,312 B2	11/26/02	Ravikumar, et al.	536	25.3
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<b>FOREIGN PATENT DOCUMENTS</b>					
<b>Examiner Initial</b>		<b>Document No.</b>	<b>Date</b>	<b>Translation</b>	
				<b>YES</b>	<b>NO</b>
	52	WO 91/04983	4/18/91	PCT	
	53	WO 92/21689	12/10/92	PCT	
	54	WO 89/11486	11/1989	PCT	
	55	WO 93/21203	10/1993	PCT	
	56	WO 94/06811	03/1994	PCT	
	57	WO 95/13833	05/1995	PCT	
<b>EXAMINER</b>		<b>DATE CONSIDERED</b>			